



Uninsurable future

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Risk Tipping Points

Interconnected

Disaster

Risks

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Abbreviations

CEA	California Earthquake Authority
EIOPA	European Insurance and Occupational Pensions Authority
EEA	European Environment Agency
ICA	Insurance Council of Australia
II	Insurance Information Institute
IPCC	Intergovernmental Panel on Climate Change
MCII	Munich Climate Insurance Initiative
NOAA-NCEI	National Oceanic and Atmospheric Administration - National Centers for Environmental Information
PAHRC	The Public and Affordable Housing Research Corporation
SIA	Swiss Insurance Association
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environmental Programme
WMO	World Meteorological Organization



A man looks for belongings through the ashes of his family's home in the aftermath of a wildfire in Lahaina, western Maui, Hawaii, in August 2023. © Patrick T. Fallon / AFP

1. Introduction

Insurance is a tool for financial risk management used by individuals, organizations, governments and businesses to safeguard themselves against the risk of uncertain financial losses, such as those occurring as a result of damage during an unexpected disaster. People purchase insurance policies by paying a certain insurance premium, which is based on the probability and severity of losses. When the loss occurs, they receive a financial compensation, based on the concept that insurance spreads the losses incurred by a few over a large group of policyholders. Today, coverage is feasible for nearly every type of risk — as long as there is supply and demand for this risk transfer tool (Surminski and Hudson, 2017; Surminski, 2014). However, providing insurance in areas prone to natural hazard events (for example wildfires, droughts, storms, floods) has been a challenge as far back as the 1920s, when many private insurers in the United States (U.S.) withdrew flood insurance cover due to the high number of losses they experienced (Kousky and others, 2020). In order to keep insurance markets viable, various governments around the world made programmes and agreements with the private sector, aiming to keep insurance affordable for people living in at-risk areas (Perry, 2016), but as extreme weather events around the world became more frequent and severe in recent years, so too has the cost of the damage they inflict. Since the 1970s, damages as a result of weather-related disasters have increased seven-fold (WMO, 2021), with 2022 alone seeing \$313 billion in global economic losses (AON, 2023). Climate change is dramatically shifting the landscape of risks, with the number of severe and frequent disasters forecast to double globally by 2040 (Swiss Re Institute, 2021a), causing insurance prices to rise and threatening the viability of insurance as an option for many. As we see areas around the world being hit with increasingly expensive damages and being pushed towards a tipping point of “uninsurability”, this report delves into the various underlying drivers of the problem and the actions we can take to avoid it.

2. Risk tipping point

There are different types of insurance regarding natural hazards, such as business interruption, vehicles, liability and agricultural insurance. However, here, we mainly focus on property insurance for people’s homes and belongings. In places where extreme weather events increasingly wreak havoc, premiums for home insurance have climbed by as much as 57 per cent since 2015 (Kamin, 2023), and people are struggling to afford coverage. In the U.S., prices for insurance premiums rose 12.1 per cent from May 2021 to May 2022 alone, with some states increasing at more than double the rate of inflation (Howard, 2022). Meanwhile, in northern Australia, disasters triggered price hikes of over 200 per cent for home insurance between 2007 and 2022 (ACCC, 2022). In the face of rising losses, some insurance providers in at-risk areas have decided to either limit the amount or type of damages they can cover, cancel policies or leave the market altogether. As of the second half of 2023, some of the biggest insurance providers in the U.S. have pulled back coverage in high-risk areas, no longer selling new property insurance policies (both for personal and business lines) or scaling back the extent of coverage offered (Flitter, 2023).

As both the risk of disasters and the challenge of accessing insurance rise around the world, certain areas may become effectively “uninsurable”. From the perspective of people relying on insurance as a risk management tool against extreme weather events, an uninsurability tipping point occurs when prospective policyholders in a given area can no longer buy the reasonable coverage needed to combat the impacts of such events on their homes and property (**Figure 1**). This threshold can be crossed in three situations: insurance is no longer *available* to them, insurance is offered but sufficient coverage is no longer *accessible* or insurance is no longer *affordable* to certain groups because of its price (Holsboer, 1995). As such, uninsurability touches both the supply side — insurers not offering products — and the demand side, as people at risk are either unable or unwilling to purchase insurance. Metrics for affordability on the demand side include when the premium in an area exceeds a set amount of income (Surminski and Hudson, 2017), or when predicted future property damages exceed a certain threshold. For example, approximately 520,940 homes are predicted to be uninsurable in Australia by 2030, as future damage costs will pass a threshold of 1 per cent of their total value (Hutley and others, 2022). This is not just a possibility. In 2013, a government agreement with insurers to maintain affordable prices known as the “Statement of Principles” expired, bringing prices back in line with actual flood risk and putting affordability in jeopardy for around 350,000 households in the United Kingdom (U.K.) (Perry, 2016). Meanwhile in the U.S. people in high risk areas such as California, a hotspot of wildfire events, are waking up to find that their insurance will no longer continue to cover them (Poizner, 2022). With damaging weather events predicted to increase in the coming years, the risk tipping point of uninsurability is becoming a critical concern around the world.

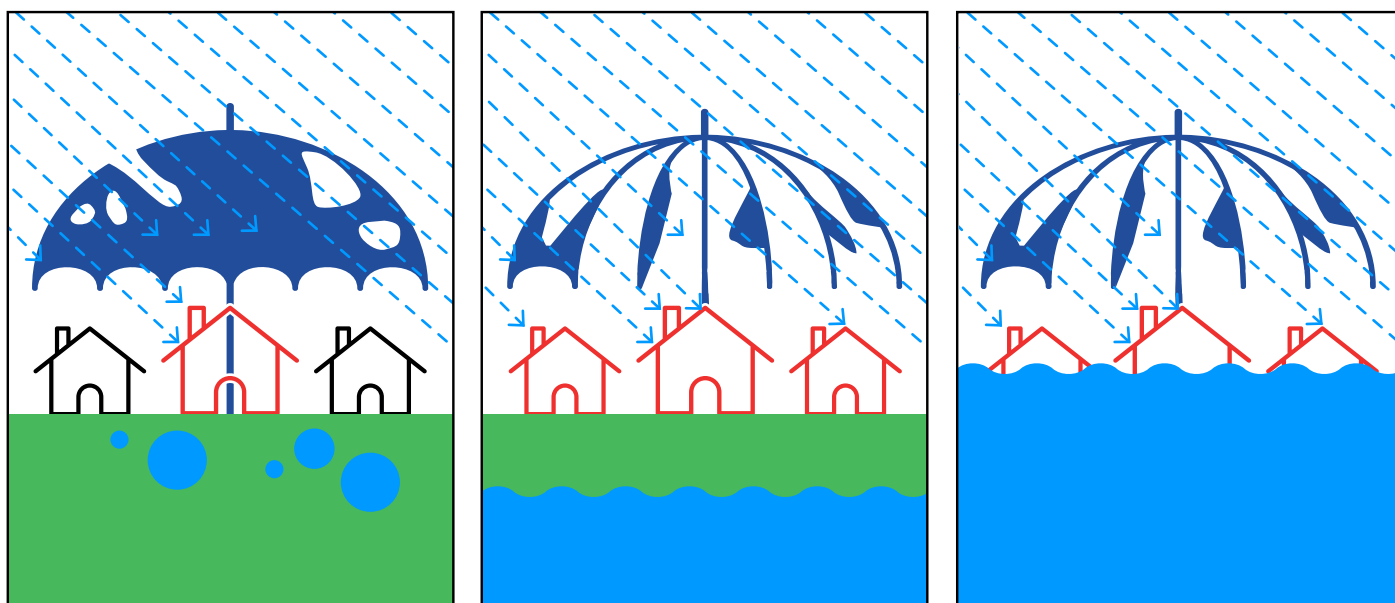


Figure 1: Uninsurability is reached as access to coverage continues to shrink and prices rapidly escalate while risk increases in certain areas (left) until either availability, accessibility or affordability of insurance coverage is no longer feasible (middle). Once tipped, homeowners and businesses are left with fewer options for coverage to offset their risk to increasing hazard (right).

3. How did we get here?

3.1 Drivers

3.1.1 Atmospheric/ocean warming

An increasing severity and frequency of extreme weather events being experienced worldwide is attributed to rising ocean and atmospheric temperatures as a consequence of continuing greenhouse gas emissions (IPCC, 2023). For example, the effect of climate change on weather patterns has been linked to amplifying risk in the cases of the California wildfires (Swain, 2021; Iglesias and others, 2021; Williams and others, 2019), flooding in eastern Australia (Swain, 2021; Rice and others, 2022) and storms in the gulf states of the U.S. (Faranda and others, 2022). Studies indicate this trend of more frequent and severe weather will continue to rise (Lu and others, 2018; IPCC, 2023), along with the patterns of increasing damage. For example, in the U.S., the number of disasters and the associated costs of the damage they have inflicted have risen dramatically (**Figure 2**). Economic losses from weather and climate-related extremes in Europe have also reached around half a trillion euros over the past 40 years (EEA, 2022). While the focus is often on extreme events, an increased frequency of moderate to severe events, also driven by a warming atmosphere, contributes to pressure on the insurance industry to maintain coverage (CRO Forum, 2019).

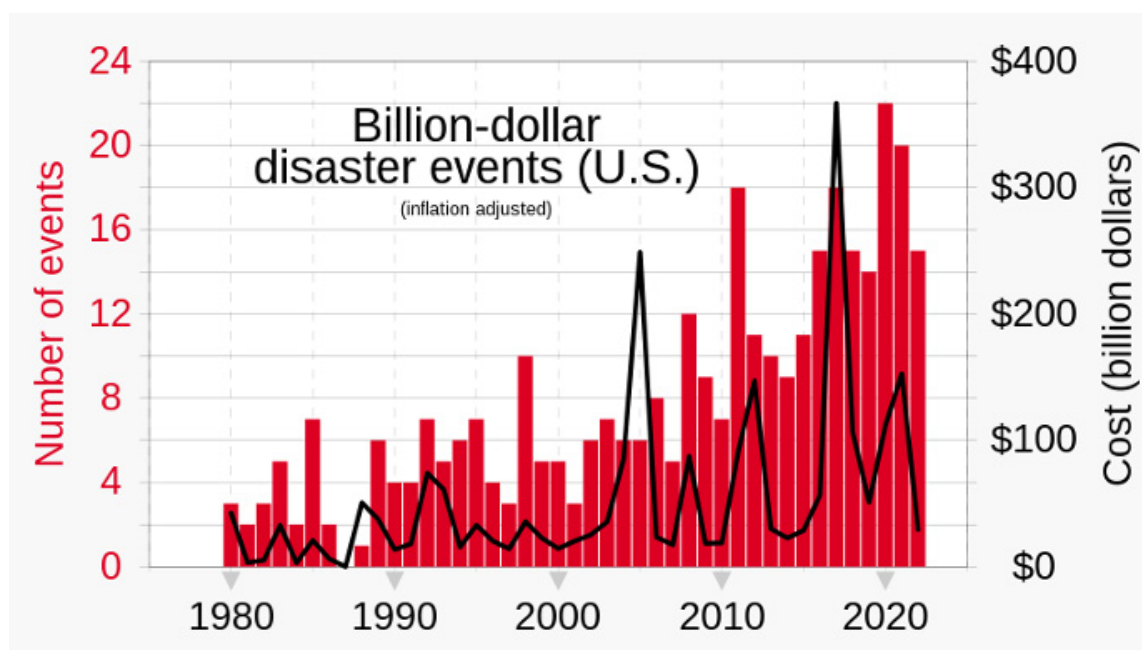


Figure 2: Billion-dollar disasters in the United States each year from 1980 to 2022, frequency of disasters (left-hand vertical axis), and the related cost of damages (right-hand vertical axis.) (source: Wikipedia, adapted from: NOAA - NCEI, 2023).

Along with becoming more frequent and severe, risks are becoming more unpredictable, catching people, governments and insurers underprepared and acting as another key driver of uninsurability. The number, location and size of at-risk areas are changing and predicted to expand as climate change shifts the range of hazards, like wildfires and storms, into new areas (Studholme and others, 2022; Krawchuk and others, 2009). This presents a major challenge for the traditional approach of the insurance industry to understand future risks — using historical data to feed catastrophe models that predict the extent and location of future losses (Charpentier, 2008). New models need to be developed that better capture future scenarios, but the inherent uncertainty of estimating future events and losses makes pricing and offering of coverage difficult. Since the insurance industry is built on risk prediction, this has created “a crisis of confidence around the ability to predict loss” (Frank, 2023). Combined with potentially higher-than-foreseen claims from increasingly damaging weather events, this unpredictability puts the insurance industry under pressure as insurance prices increase to reflect the increase in risk, while based around uncertain predictions.

3.1.2 Risk-intensifying land use

Urbanization patterns over recent years have increased the concentration of people and places at risk as developers continue to build in high-risk areas (Charpentier, 2008). Apart from increased insurance prices to reflect the higher expected losses, this value concentration is a major problem, as many claims at the same time can threaten an insurer’s financial stability. For example, from 1990 to 2010, the number of houses in the U.S. located in the wildland-urban interface, a prime area for wildfire risk, grew 46 per cent (Mockrin and others, 2022). Meanwhile, on the east coast of the U.S., homes are being built at a rate two to three times faster in flood-risk zones compared to those of safer locations (Climate Central, 2019). High property values are increasing in exposed areas, such as those exposed to wildfires (Wibbenmeyer and Robertson, 2022), as these properties are often close to nature and have high recreational value, further motivating development patterns. At the same time, it is often easier to provide affordable housing in other at-risk areas, resulting in highly exposed assisted housing (PAHRC and The National Low Income Housing Coalition, 2021). In the U.K., regions with the highest flood risk have had over 70,000 homes built since 2009, including 20,000 with no physical flood protection measures (Jackson, 2020). Outside of urban areas, development in rural areas can also increase exposure, predominantly to floods, tornadoes and wildfires (Iglesias and others, 2021). This is even more important for developing countries and emerging economies where booming urbanization, combined with poor urban planning approaches, leads to the most vulnerable people living in the most at-risk areas (UNDRR, 2013).

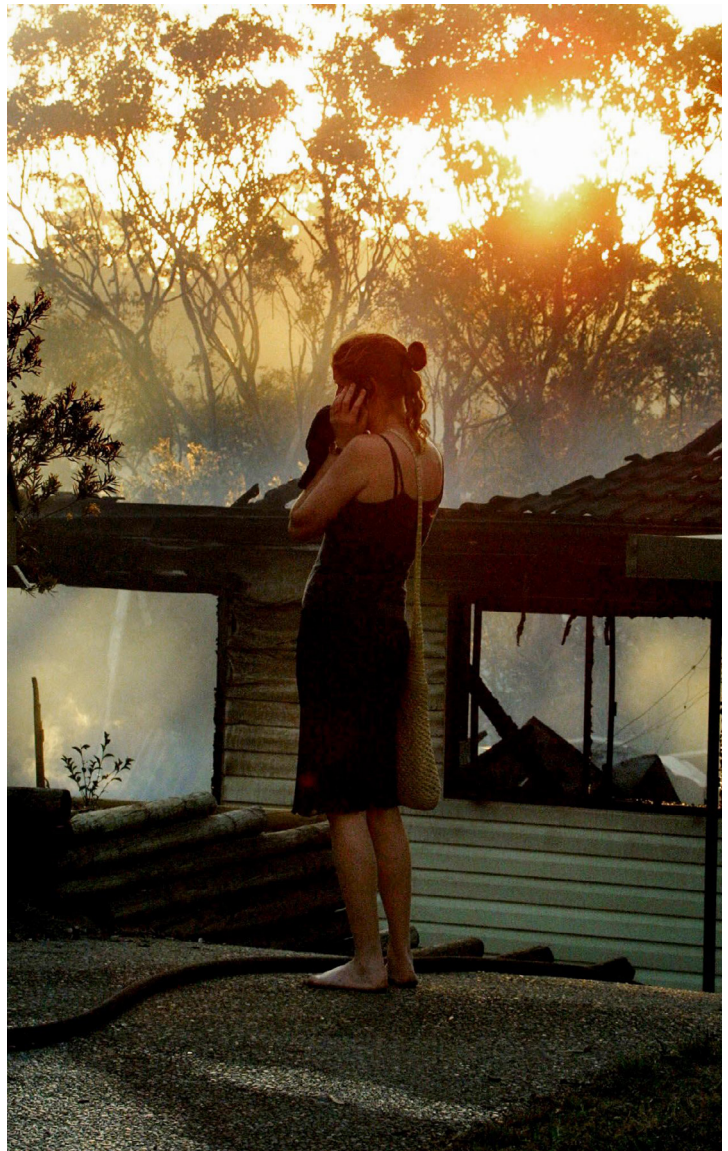
3.1.3 Living and working in at-risk areas

Population growth and development continue to increase in risky areas as social and economic pressures influence more people to flock to places along the coasts, rivers, floodplains and wildland-urban interfaces. Patterns of migration in the U.S., for instance, indicate population growth in high-risk areas increasing as much as 3 per cent per decade more than that of low-risk areas (Indaco and others, 2023). In the period of 2016–2020 alone, U.S. counties with the largest percentage of homes at high risk of heat, fire and flood had population increases of 4.7 per cent, 3 per cent and 1.9 per cent respectively, while places with relatively low climate risk saw population declines (Katz and Sandoval-Olascoaga, 2021). This trend toward risk-taking in home location choices is reflected globally, where population in flood plains increased by 114 per cent and in cyclone-prone coastlines by 192 per cent during the 40 years from 1970–2010 (Hallegatte, 2011). The number of people living in disaster-prone areas is expected to rise in the coming years. For example, the number of people in the U.K. living in flood-prone areas is expected to rise by 45 per cent by 2080 (Sayers and others, 2018). On a global average, the at-risk population is expected to increase from 18 per cent today, to 36 per cent in a 2°C warming scenario and 45 per cent in a 3.5°C scenario, with stark regional variability (Marsh McLennan, 2023).

3.1.4 Lack of future planning

Governments are tasked with spatial planning, red-zoning and incentivizing housing development in safe areas, yet this continues to be a struggle on different levels with regards to adequate risk planning. Historically, the location and design of human settlements were often decided without factoring in future risks but rather focusing on the benefits of a given location (for example transport linkages in river deltas). Once built, the historic infrastructure and housing shape and constrain future choices and developments, leading to people living in high-risk areas today (Varanasi, 2021). The lack of forward planning affects both affordability and availability, driving uninsurability. For over a decade, climate models have predicted the price of insurance could increase significantly, yet authorities have been slow to address risk-reduction recommendations (Kunreuther and others, 2013). As prices rise, governments may decide to cap premium prices to maintain affordability, and insurers in turn may decline to insure risks in a specific area, thus reducing availability. For example, the German floods in 2002 cost the public sector €9 billion. The subsequent risk reassessment by insurers resulted in premium increases of up to 50 per cent but a reduction of 10 per cent to 20 per cent in geographic areas where flood insurance was available (CRO Forum, 2019).

Civil planning and engineering choices by government that do not adequately factor in future risk not only affect the exposure of property and people, but also directly affect hazards. When natural soil surfaces are covered with asphalt or concrete, or compacted by improper agricultural practices, rainwater can no longer be quickly absorbed, increasing the risk of flash floods (USGS, 2003). Additionally, deforestation and degradation of ecosystems for short-term economic gains reduce the natural defences against hazards they could have provided (Marsh McLennan, 2023).



A woman stands in front of her burned house in the suburb of Engadine in southern Sydney on 8 October 2002. The Australian bushfire season struck early and with sudden ferocity, destroying at least ten homes and forcing large scale evacuation. © DAVID HANCOCK / AFP

3.1.5 Lack of information

Issues around a lack of proper information drives uninsurability in two main ways. First, the unavailability of relevant data hinders insurance providers in offering effectively priced insurance products. Limited information on hazard risks for a specific location prevents insurers from determining the true risk, which leads them to deem an area uninsurable. For those areas covered by an insurance product, there is limited information on individual mitigation actions taken by specific households to reduce risk and their real impact on the insured assets. Therefore, insurers do not consider the influence of these actions on reducing risk and therefore cannot adjust insurance premiums accordingly. Other data that is often not considered in the classic insurance models are socioeconomic factors that influence the vulnerability of people and assets (de Vet and others, 2019). The simplistic focus of insurance models in assessing the vulnerability of assets alone, and the lack of understanding of wider vulnerability that can contribute to where and how insurance is purchased, could see the continued growth in the “protection gap”. This gap between insured and uninsured losses is an indicator of how much damage was not covered by insurance in a given area, and therefore, the level of insurance lacking to cover it. The protection gap reached a new high in 2022 at an estimated \$1.8 trillion (Aggarwal and others, 2023).

The second challenge lies in the way knowledge and information are shared. The most comprehensive data sets and modelling are held by the major reinsurance firms, and due to stringent policies on data-sharing and accessibility, many insurance companies are unable to use the best available data to price their policies. Data on disasters, insurance claims and hazard models are a valuable resource for insurers and are often not shared in order to keep a competitive advantage. Thus, there is a lack of data transparency with government and communities that can contribute to inferior risk management. Awareness around risk factors such as what recurring hazards are predicted in the region, where the exposed areas are and the potential extent of financial impacts, are essential for people to make informed decisions to reduce their risk or purchase insurance (Kiwanuka and Sibindi, 2023). Such actions are unlikely to be taken without readily available risk information including up-to-date hazard and risk models, which is often currently lacking (Schuetz and others, 2023). If policyholders and insurers do not have access to the same information, behaviours contributing to uninsurability can arise such as “adverse selection” (tendency of people with high risk to seek insurance) and “moral hazards” (riskier behaviour of the insured after they have purchased insurance) (Surminski, 2014).

3.1.6 Increasing cost of reinsurance

Insurers take on risks from individuals and businesses, but they also need to manage their own risk, namely from extensive payouts exceeding their capacity. Reinsurance can be thought of as insurance for insurance companies — when an insurer receives a claim, a reinsurer covers a pre-agreed part of the loss, hence providing security and reducing volatility. Reinsurers are large organizations with extensive resources that can insure different types of risks all around the globe. This risk diversification reduces the reinsurers’ risk of disasters and subsequent simultaneous claims, and thus, allows them to take on higher risks and provide protection to more local insurers which face this accumulation risk (Swiss Re Institute, 2015). Since they have a global perspective, a disaster raising the risk profile in one area could raise the price in other areas, even if no recent hazard events struck there. Reinsurance costs are passed on by insurance companies to the policyholders, so when reinsurance prices rise, it can raise the cost of insurance. Like insurance companies, reinsurers can also decide to retreat from a specific region or market if the expected losses exceed the risk they are willing to cover. In a purely private market setting, one without public or government partnerships, a lack of reinsurance coverage will likely lead to the withdrawal of local insurers from the market.

3.2 Root causes

3.2.1 Human-induced greenhouse gas emissions

The emission of greenhouse gases (GHGs) from human activities since the advent of the industrial revolution has been accelerating the warming of the Earth's atmosphere in recent decades, leading to significant changes in climatic conditions (IPCC, 2023). For example, the rise in atmospheric temperature as a result of GHG emissions has driven increased ocean warming, reflected in temperature trends at both the sea surface as well as deeper levels, which is linked to increasingly severe weather events (Foerster, 2021; Gibbens, 2021; IPCC, 2023). The rapidly growing field of attribution science examines the causal influence of climate change on extreme weather events, showing, for example, that the floods that devastated Germany, Belgium, Luxembourg and the Netherlands in 2021 were 1.2 to 9 times more likely to occur than they would have been 100 years ago, due to climate change (Cho, 2021).



*Houses are pictured inundated with floodwaters along the overflowing Hawkesbury River in the Windsor suburb of Sydney on 9 March 2022.
© SAEED KHAN / AFP*

3.2.2 Inequality of development and livelihood opportunities

As mentioned above, urban development and population growth is continuing in high-risk areas, and this is driven in part by economic factors disproportionately affecting poorer people. At-risk areas can be much cheaper and poorer people are more likely to prioritize proximity to economic opportunity over the risk of living in certain areas (Hallegatte, 2011). Meanwhile, people living in disadvantaged neighbourhoods are more likely to be living in places with less resilient infrastructure towards hazards and less investment from local government to protect areas with lower value assets (Hallegatte, 2011). Therefore, poorer communities are more likely to be vulnerable to uninsurability tipping points due to a combination of higher exposure and fewer coping strategies (Schanz, 2020). Urban development in areas predicted to be at high risk of extreme events in the future is also often disproportionately represented in struggling or declining neighbourhoods, creating enabling environments for future uninsurability (Rözer and Surminski, 2021).

3.2.3 Insufficient risk management

The combination of worsening hazards and rising exposure and vulnerability increases risk and is the primary issue driving different areas towards uninsurability tipping points. A key root cause behind the drivers of pressure on insurance markets is insufficient risk management. Identified risk management failures include governance issues such as not adapting to changing risk levels, overlooking socioeconomic impacts and ineffective incentives. In land use and infrastructure, problems include permitting risk creation, relying too much on grey infrastructure and neglecting nature-based solutions. On the financial side, insurers face disruptions, lack resilience measurement and suffer from chronic underinvestment in risk reduction and preparedness (Marsh McLennan, 2023). However, behavioural biases can influence consumers, insurers, regulators and politicians to make poor decisions related to risk management, especially for low-probability, high-consequence events. People tend to estimate the likelihood and impacts of future disasters by recent past experience and focus on short time horizons when comparing expected investment and protection benefits. Residents in exposed areas also fail to take protective measures if they perceive the risk as too low (Kunreuther and others, 2013). Even when risks are known to people, this often seems to have little effect on their perceptions of possible future impacts to them and their property, and thus people continue to migrate to and reside in risky areas (Palm and Bolsen, 2022).

“Short-termism” also affects investors as well as governments, leading to interventions with short-term benefits but erosive long-term effects (Andor and others, 2020). For instance, even well intended and intentional spatial planning can have negative side effects, as when containment strategies for urban sprawl increase the density of housing in risk areas (Burby and others, 2001). Research shows that through risk reduction financing or providing aid relief, efforts by governments to make dangerous locations safer can actually raise the possibility of catastrophic property destruction and financial loss by enabling people to live in or move to at-risk areas, such as the case of Louisiana in the aftermath of Hurricane Katrina (known as the “safe development paradox”) (Burby, 2006). Additionally, even though their constituents may suffer disproportionately in terms of both human suffering and financial loss during catastrophes, local politicians do not focus enough on enacting laws that would reduce vulnerability — either by enforcing disaster risk reduction actions or by restricting settlements (Burby 2006). Political interests such as attracting a higher tax base can hinder appropriate declaration of risk zones (Varanasi, 2021). When regulations exist, there is often a way to issue exceptions or otherwise circumvent them (Kreft and others, 2022), and the planning horizon is now becoming recognized as too short: modern-day land use planning settings and associated building controls do not adequately protect property from flood risk, as they often only consider disasters up to the 100-year event. However, through climate change, events that are considered rare today will become more frequent (ICA, 2022).

3.2.4 Repercussions of economies and the capital market

The tipping point of uninsurability is influenced also by large-scale economic factors. For example, rising inflation and skyrocketing rebuilding costs are often cited in decisions by insurers for withdrawing insurance coverage (Mac, 2023). Economic factors are also important in the decision-making process of potential policyholders, and higher costs of living and decreased purchasing power of individuals affect levels of insurance coverage, especially when coverage is perceived as non-essential (Booth and Tranter, 2018). Insurance companies are also susceptible to large-scale economic changes, as insurers and reinsurers maintain sufficient financial resources to cover their own risks and turn profits for their stakeholders by reinvesting heavily in capital markets with the premiums they collect (Swiss Re Institute, 2015). As such, the industries are sensitive to changes in the financial market, whether brought about by economic fluctuation, regulatory changes or global trends or shocks such as the COVID-19 pandemic. For example, changes in interest rates can affect the investments and capital base of a reinsurer and subsequently influence their capacity for coverage (Schanz and Treccani, 2023).

3.3 Influences

As many of our systems are interconnected, crossing a risk tipping point in one system results in system changes that can cascade into other systems and increase risk, accelerating momentum towards other tipping points. From the Interconnected Disaster Risks 2023: Risk Tipping Points report, two other risk tipping points were identified that, if crossed, could influence uninsurability, namely:

- **Accelerating extinctions** — the resulting ecosystem degradation stemming from cascading extinctions could occur in ecosystems providing nature-based protection from extreme weather events, increasing exposure and affecting potential damages.
- **Space debris** — one effect of losing our space-based monitoring infrastructure would be our reduced capacity for gathering data on large-scale weather patterns and dynamics used to model future risks and damages, further increasing the risk of uninsurability

4. Where are we headed?

Current and future impacts

4.1 Loss of safety

Insurance is a key tool to manage the financial risks of a disaster. Studies show that insurance significantly affects resilience by supporting a more rapid recovery process (Hudson and others, 2020). A lack of insurance can lead to households being unable to swiftly finance reconstruction after a disaster or allow only incomplete repairs. Households and firms will need to recover while relying on savings or credit, making them vulnerable to slipping into a vicious cycle of debt. Alternatively, they must rely on charity or government relief, which is likely to be less efficient than robust insurance coverage (EIOPA, 2023).

This loss of a safety net can also affect mental health, increasingly recognized as an impact in the wake of disasters, with those living through disasters reporting varying levels of mental health impacts that can remain for many years afterwards (Newnham and others, 2022; Gergis and others, 2023). Uninsurability can exacerbate the lack of peace of mind before a disaster and the financial stress after the impact, as affected people often have to live in adverse conditions for months (Ramirez, 2021), or need to move out of their homes altogether, putting further stress on people and communities.



Flames crest a hill, threatening homes in the Stevenson Ranch section of Santa Clarita in Los Angeles County, 28 October 2003, as wildfires continue to rage across the state.
© ROBYN BECK / AFP

4.2 Migration/displacement

Areas becoming uninsurable could lead to voluntary or involuntary human mobility. The loss of safety or resulting socioeconomic impacts could motivate some people to move to other areas (Wilkinson and others, 2016). Without the ability to recover property damages, people may be pushed to move rather than stay in harm's way without a safety net. This is especially true for vulnerable groups and renters, whose properties are more likely to experience damages while also having lower levels of access to insurance schemes (Li and others, 2023). Communities that are already marginalized would be hit even harder by climate change. In some parts of Louisiana and Georgia in the U.S., black and Indigenous communities already suffer disproportionate impacts of climate change (Lustgarten, 2020). For Indigenous communities, mobility after a disaster can often be especially difficult due to strong ties to the land as a fundamental part of self-identity (Gouritin, 2020). Additionally, concerns with mobility are amplified in Indigenous communities due to potential implications concerning sovereignty over land, as moving would not only pose socioeconomic impacts but also legal implications related to the lack of support and reconciliation efforts from authorities (Zhang and others, 2021). Yet, uninsurability risks for Indigenous communities are high regarding affordability, accessibility and availability, which has contributed to “a long history of First Nations and Métis people being uninsured” (Wong and Reith, 2023). Special attention will be required to ensure that Indigenous communities are not left behind.

4.3 Cascading socioeconomic and macroeconomic impacts

Without the ability to access insurance, people are exposed to drastic financial losses, reduced incomes and may also find it difficult to buy or sell uninsurable homes, affecting the stability of housing markets (Kamisher and others, 2023; Ulubasoglu and Tong, 2021). Getting a loan for a house or property often requires proof of insurance, thus uninsurability will severely limit lending, especially to lower income individuals. Additionally, a wide loss of property insurance in an area also exposes local banks to credit risks (EIOPA, 2023). Government subsidy schemes can help to relieve pressure on falling property prices; however, recent studies suggest this can disproportionately benefit high-income areas and high-value properties (Garbarino and others, 2022). Uninsurability will also affect businesses and services, as seen in 2019 when the price of commercial property insurance jumped by over 10 per cent globally in one quarter alone (Evans, 2020). Increasing unaffordability in commercial insurance coverage reduces the potential for community development and other activities, including those that may help to reduce risk, such as controlled burning for wildfire management (Sherfinski, 2023). These dynamics will contribute to rising inequality in uninsurable areas as people and businesses, who are able to, will move away. Those already vulnerable will be forced to stay and, in addition to those who come seeking cheaper housing in these areas, will face increasingly extreme events without insurance coverage.

Additionally, the lack of insurance will also drastically increase the burden on governments to step in and cover uninsured losses, leading to higher debt levels and increased economic divergence (EIOPA, 2023). As insurers withdraw, governments will see themselves forced to act as an insurer of last resort or provide frequent disaster relief. However, some government-led insurance programmes are already struggling to cover an ever-increasing number of high-risk properties and claims (Ill, 2023). For example, the United States' National Flood Insurance Program (NFIP), one of the most well-known public schemes for U.S. homeowners living in flood zones, is currently in over \$20 billion of debt (Cho, 2022). Even so, the role of the public sector is critical. Already today, disasters cause an increase in government transfers, such as unemployment and public health insurance schemes, for as much as one decade after the event (Deryugina, 2017). Aside from costly fluctuations in welfare requirements, the loss of uninsured personal or family assets perpetuate poverty by undermining the potential to accumulate future assets (Schanz, 2020). Uninsured disaster losses also negatively impact GDP and inflation and are predicted to rise with climate change. Without any adaptation or mitigation measures taken and a temperature increase of 2°C by 2050, it is predicted that yearly damages from climate-related disasters in the European Union and the U.K. will rise from a baseline of 0.17 per cent of GDP to 0.29 per cent in 2050. In a no-insurance scenario, GDP levels in 2050 could be 3 per cent lower compared to a scenario with insurance available (EIOPA, 2023). Taken together with changes to housing markets, local tax bases and increasing public sector responsibility for coverage, the future social and economic impacts of uninsurability are potentially wide-ranging and at best uncertain.

5. The future we want to create

To assess solutions for avoiding risk tipping points, we must consider these key questions: Does the solution attempt to prevent negative system changes or focus on adapting to the changes? Does the solution work within the current system or drive a fundamental reimagining of the system? Answering these questions is critical for understanding how different actions advance risk reduction goals and yield varied outcomes, including potential consequences and trade-offs. To navigate this, we have developed the ADAT2 framework, which classifies solutions into four categories: Adapt-Delay, Adapt-Transform, Avoid-Delay, and Avoid-Transform — see the [main report](#) for details.

5.1 Adapt

Adapt actions reduce exposure to post-tipping point impacts and prepare for sustainable living within the new system. If affordable insurance is no longer offered in a given area by the private sector or national government plans, there are few available alternatives to adapt that do not face the same issues in terms of increasing risks. Informal risk-sharing has long been a part of traditional approaches to climate risk management (Germanwatch and MCII, 2020), and one innovation being considered is the potential viability of Community-based Catastrophe Insurance (CBCI), a type of disaster insurance programme arranged via a partnership between local government and community groups to cover individual properties within the community (Bernhardt and others, 2021). Due to its localized scale, CBCI could make coverage more affordable through reducing administrative costs and enhancing buying power with means-tested assistance programs for lower-income members, while incentivizing community-level mitigation measures (Kousky and others, 2020). These local schemes could promote insurance uptake as smaller, tight-knit community groups which may be more likely to act in solidarity and share risk by maintaining high levels of insurance coverage, while shifting insurance away from dependence on capital markets. However, the challenge of covering increasing damages with climate change would remain.

One of the only options for adaptation to avoid growing economic losses in uninsurable areas where risk mitigation measures are unviable, is the managed relocation of people away from high-risk areas (Marsh McLennan, 2023). When risks are identified as intolerable by either government or residents, a decision is taken to move to a safer location. Such initiatives are already underway. In Louisiana, one of the most disaster-prone areas of the U.S., the country's first nationally-subsidized, community-driven relocation of people for climate adaptation is being carried out in the community of the Isle de Jean Charles (Whybrow, 2018). Although buildings in the new community have been built to more robust standards for hazard resilience, continued planning and communication issues, particularly for Indigenous community members, have highlighted the need for more engagement to manage diverse values and perspectives of local people (Reynolds, 2023). It must not be understated that managed relocation or retreat actions must be properly managed to ensure that people are supported and equitable outcomes are achieved in the destination location for people moving (Hino and others, 2017).

5.2 Avoid

Avoid actions alter the system to prevent crossing risk tipping points. Most actions to tackle the looming threat of uninsurability at present come under the category of Avoid-Delay, meaning that while they seek to address aspects of the problem, the root causes of the risk tipping point and the kinds of system transformation needed for long-term risk reduction are not accounted for. Common approaches focus on keeping premiums affordable via agreements between governments and the private sector to provide subsidies, share the burden of large claims or arrange programmes so the government can act as an “insurer of last resort” for those no longer able to access insurance from private companies. For example, Flood Re in the U.K., a government-backed reinsurer, reported a price drop of up to 50 per cent in premiums for four out of five houses with flood claim histories since its launch (Department for Environment, Food & Rural Affairs, 2023). However, such schemes will struggle to remain sustainable with increasing climate change impacts widening the gap between the true risk price and the subsidized premium (Surminski, 2018). Other solutions seek to improve data availability and transparency to allow for better risk modelling, risk pricing and calculation of loss trends, by capitalizing on data sets from new sources such as big data and remote sensing technology (Swiss Re Institute, 2021b; Arnoldussen and Hauner, 2016). These approaches contribute to a more accurate and, in some cases, more affordable pricing, and can contribute to keeping insurance available as insurers can calculate and manage their risk. Nevertheless, such approaches remain reactive and do not address increasing risks directly, so can only delay uninsurability for certain areas as insurance companies will eventually be overwhelmed (Surminski and others, 2016). Uninsurability is a symptom of many problems. Dealing with it using traditional Avoid-Delay measures addresses the symptom but not the systemic problems acting as underlying causes. For a resilient society where insurance plays its intended part alongside other risk reduction measures, all risk drivers and causes need to be addressed, and for this, the way we approach insurance needs to transform.

5.3 From Delay to Transform

Many of the solutions above focus on mechanisms keeping insurance at an affordable price, but there is a paradox in this. If customers can buy cheaper flood insurance, they may be less concerned about taking wider action to manage flood risks. As such, insurance is most useful when used in combination with other risk reduction measures, and should not be perceived as a license to live in hazardous situations. Transformative approaches to tackle not only the vulnerabilities in the insurance industry, but also all the underlying social and environmental drivers of risk need to be addressed. The ultimate aim must be a resilient society in which insurance can play its part as a valuable safety net in an interplay with many other measures.

5.3.1 Reducing the underlying risk and building forward with nature

For insurance to remain a viable tool, the residual risk, which is the remaining risk after all risk control mechanisms have been deployed, needs to be kept at a manageable size for prices to remain at a level affordable for both the insurance provider and the policyholder. There are various ways to retain affordability. However, the key point is that governments, insurance providers and individuals need to foster a transformational approach when investing into disaster and climate resilience. All aspects of risk — hazards, exposure and vulnerability — that drive us towards uninsurability must be targeted. Investments and actions that limit climate change to well below 2°C are paramount in order to minimize the increasing impacts of extreme changes in weather patterns; therefore, governments, the private sector and individuals must urgently work together to reduce GHG emissions (IPCC, 2023).

Investment can drive innovative approaches to reduce underlying risk. In affected areas, exposure can be reduced by adapting to hazards through designing and implementing defences that maximize the use of nature-based solutions. Options include rewilding of urban areas and hybrid infrastructure to boost sustainable resilience to extreme weather, such as the restoration of shellfish reefs and adjacent coastal vegetated ecosystems in Australia (Morris and others, 2021). Importantly, such solutions are more adaptable over a longer timescale and to changing future conditions while providing more environmental and social co-benefits compared to more costly, traditional grey infrastructure methods (Hynes and others, 2022). Innovative design can also reduce the vulnerability of buildings to hazards, making them more climate-ready by using more resilient materials, elevating living areas or integrating buoyancy potential. Optimally, the various approaches for adaptive defence and design against climate-related hazards will be integrated as part of comprehensive strategies for resilient infrastructure, education and outreach, and cooperation with local regulations and planning to be effective (Shaw and others, 2007; Israeli and others, 2020). Nevertheless, even with these innovative approaches, new buildings in high-risk areas must be restricted through red-zoning and land-use restrictions, while options for managed retreat from high-risk areas continue to be investigated.



Typhoon-proof dome houses to rise in Dapitan, the Philippines © UNEP, 2021

5.3.2 The role of a transforming insurance industry

A more transparent, innovative and forward-looking insurance industry could assist in addressing underlying risk in various ways. Moving the focus away from solely economic mechanisms to tackle affordability, insurance companies could play a major role in influencing risk perception and awareness by fostering more transparency and accessibility to the wealth of data and modelling they generate on hazards, risks and already-occurring losses and sharing the data with local governments and communities. People need to be aware of their disaster risk in order to start contemplating protective measures or financial solutions. Raising awareness for protection against climate risks and natural hazards must be comprehensive and group-specific. Local authorities and the insurance sector should cooperate to provide clear and easily understandable information on hazards and exposure (for example through open access websites), as well as existing insurance options and their conditions (Kreft and others, 2022). In addition, insurers should increase incentives for, or mandate the adoption of, adaptation measures in their policy premiums as a way of encouraging more ownership of risk reduction among private citizens and local communities. Such an approach has the potential to reduce residential flood risk in places like Germany and France by up to 12 per cent and 24 per cent respectively (Hudson and others, 2016). Insurers can also incentivize and fund the kind of risk reduction activities described above by offering new underwriting products supporting the development of nature-based solutions and green technologies (Favier and others, 2023), and steer more resilient land-use planning through their insurance requirements.

Even as insurance companies in the U.S. pull out of markets in areas hardest hit by climate change and increasingly recognize the threat of climate change (noting for example “A +4°C world is not insurable.” (AXA, 2017)), the industry invests heavily in sectors contributing to climate change, with around 536 billion USD in fossil fuel-related assets as of 2019 (ERM and others, 2023). Aside from investing in industries contributing to increasing economic losses, insurance companies could end up with “stranded assets”, assets with values that have collapsed as a result of disruptive policy or technological change (Semieniuk and others, 2022), due to the global transition towards decarbonization across various sectors. These “stranded assets” further pressures the ability of insurers to stay economically afloat. The insurance sector can encourage more sustainable development while reducing their financial exposure by shifting investments towards more climate-friendly portfolios.

5.3.3 Forward-planning government and new partnerships

Through regulation and policy, governments have the ability to encourage more effective adaptation to risk tipping points at the societal level. However, they must take the transformative step and use their authority with legal frameworks and regulations to anchor the obligation to adapt to natural hazards and reduce disaster risk. Hazard protections such as flood barriers could be regulated in the same way as fire alarms in certain areas. Public authorities could also incentivize such action through public support or tax refunds for adaptation measures implemented by businesses and individuals. Meanwhile, the use of legal instruments, such as construction law, water regulation or insurance supervision, should be strengthened to facilitate risk prevention and regulate land use by, for example, prohibiting further development in highly exposed areas by red-zoning them (Kreft and others, 2022). Increased disclosure requirements and new regulatory frameworks could spur innovation (Marsh McLennan, 2023). In terms of insurance persisting as a risk management tool in the coming future, our society and government should collectively think about how to manage climate risks across the population, including identifying who bears the risks and costs.

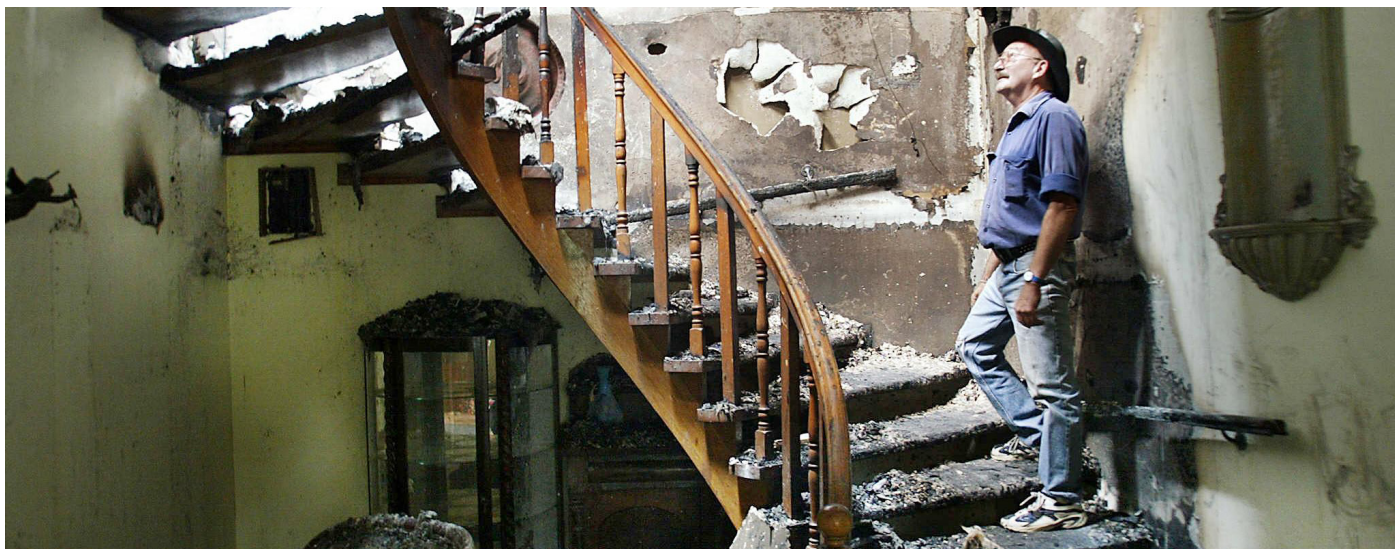
When more people with different levels of risks participate in a risk-sharing solution such as an insurance scheme or a resilience-focused public-private risk pool, coverage of high risks is still possible (Marsh McLennan, 2023). These risk-sharing arrangements could be a long-lasting solution. An example is Switzerland, where a risk pooling scheme for natural perils is based on a twofold solidarity so that even high-risk regions remain insurable: first between all policyholders, since they all pay the same premium, and second between the insurance providers, which share the losses according to their market share (SIA, 2021). Any society-wide regulation should be based on close cooperation among the government, the private sector, civil society representatives and academia. An open and inclusive exchange format, such as a climate risk commission, could be institutionalized to reach a favourable compromise for all while avoiding one-sided interventions. To be feasible and acceptable, the payouts of such schemes should be used to cover critical damages and urgent reconstruction, and any subsidization programme should be carefully designed to include incentives for disaster risk reduction (Balogun and others, 2021).

Governments from the national to the local level must also transform to mitigate increasing risks by creating structures and authorities dedicated to addressing certain hazard risks in a targeted way. For example, the California Earthquake Authority (CEA) is a privately funded and publicly managed insurer created after a 6.7 magnitude earthquake hit the San Fernando Valley in 1994 and caused \$26.4 billion in damages, the most expensive quake in the country's history (Egan, 2023). After the event, around 93 per cent of insurance companies dramatically reduced issuing homeowner's insurance policies or stopped writing them altogether, threatening insurability (Egan, 2023). The CEA joint partnership involving the government, insurance companies and civil society has focused on providing incentives and education programmes for cost-effective retrofitting of houses to boost earthquake resilience (CEA, 2023), and has contributed to an increased availability of homeowners' insurance products in California. Creating entities responsible for hazard governance would also enhance coordination among sectors that could develop and manage mitigation plans more effectively at the local level (Keith and others, 2021). For example, the Office of Heat Response and Mitigation recently formed in Phoenix is tasked with working across departments, together with external partners, to establish and implement a strategic action plan on urban heat events (City of Phoenix, 2021). While heat may not be a primary driver of loss and damage, such collaborative government actions represent the kind of recognition and targeted action required to tackle the underlying risks that amplify hazards into disasters and push areas towards uninsurability.

6. Conclusion

Insurance, at first glance, might seem like a solely technical endeavour led by private sector companies in partnership with the government. In reality, insurance poses a question to the whole society about risk: who owns it, who should pay for it and who decides on these questions. Already today, the protection gap — financial losses which are not insured — is high: in the United States, 57 per cent of flood losses are uninsured, 26 per cent in the U.K. and 63 per cent in Germany (Marsh McLennan, 2023). When it comes to insurance against disasters, climate change is posing severe issues that limit availability, accessibility and availability which can result in uninsurability of certain areas and perils. When we cross the risk tipping point of uninsurability, the home and property insurance system will be unable to help people when disaster strikes, causing wide-reaching and cascading socioeconomic impacts through financial difficulties and difficult recoveries. In order to transform and maintain a viable insurance system, issues need to be addressed both by insurers and governments on the supply side, and by the people at risk on the demand side. Solutions need to be found within society if we do not want to increase the burden on vulnerable individuals of managing such existential risks that are caused in part by a collective failure to mitigate climate change. Limiting global warming is essential, as a world with 3–4°C warming is deemed uninsurable. However, coordinated approaches that address underlying risk and risk management failures, as well as fostering innovative insurance and risk financing mechanisms, are key for a viable insurance market in the future. Additionally, the right balance will need to be found between individual responsibility, collective solidarity and managed retreat.

This report mainly discussed uninsurability issues in the countries of the global north, but climate change and its impacts are even more severely experienced in climate-vulnerable developing countries (Schäfer and others, 2016). While uninsurability has slightly different drivers in many of these countries, the consequences remain the same. A lack of tools to effectively manage climate change and disasters will result in a personal loss of security and well-being, financial instability and limited economic growth. By sharing risks collectively, insurance is a form of solidarity, and losing it as a risk management tool will strain other solidarity schemes such as unemployment and health services, building vulnerability and pushing other systems towards risk tipping points. Collective solidarity is also necessary on a global level, but even more than that, it is a historical responsibility of people and countries in the emitting countries of the global north (Hirsch and others, 2022). We need to strive to develop and maintain solutions to financially protect climate-vulnerable people worldwide, regardless of their income.



A local resident inspects a damaged house in the Blue Mountains, Australia, in December 2002. Cooler conditions have helped firefighters contain more than 70 fires which have destroyed 48 homes in the areas surrounding Sydney. © William West / AFP

7. References

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